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AUTHOR Tesh, Anita S.; Jaeger, Richard M.
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ABSTRACT

The effects of "bona fide" homogeneous grouping of students in grades 4 through 8 in a southeastern school system on the students' subsequent academic achievement were studied. These effects were studied for black students as well as for all students regardless of race, across 2 years. The student population was composed of over 4,800 fourth- through eighth-grade students, assigned to language arts and mathematics classes on the basis of their scores on the California Achievement Test Battery taken in the spring prior to class assignment. This method of grouping had been approved by the Office for Civil Rights of the U.S. Department of Education with the stipulation that student achievement be evaluated every year. When the effects of "bona fide" homogeneous grouping were summarized for all children regardless of race, detrimental effects predominated. Examination of the 2-year effects for black students revealed mixed results for language arts and consistently detrimental effects for mathematics. The use of "bona fide" homogeneous grouping appeared clearly beneficial only to black students whose initial language arts achievement scores were low. These findings suggest that the assignment of students on the basis of homogeneous grouping should be questioned. Nine graphs illustrate the performance of groups, and 14 tables summarize study data. (SLD)

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AN EVALUATION OF THE EFFECTS OF *BONA FIDE* HOMOGENEOUS GROUPING ON THE ACHIEVEMENT OF ELEMENTARY SCHOOL STUDENTS

Anita S. Tesh
Richard M. Jaeger
Center for Educational Research and Evaluation
University of North Carolina at Greensboro
Greensboro, NC 27412-5001

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the American Educational Research Association
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Perspectives:

Grouping students according to some measure of their abilities, also called "tracking", has existed since the inception of public education in the United States and is a near universal characteristic of public education today (Nevi, 1987; Oakes, 1986; Slavin, 1987a). A wide variety of methods have and are currently being used to form homogeneous student groups. Students have been grouped on the basis of age (Mobley, 1976; Slavin, 1987b), intelligence test scores (Piland & Lemke, 1971; Williams, 1973; Abramson, 1959; Nolan & Taylor, 1986; Slavin, 1987a; Wardrop, Cooke, Quilling, & Klausmeier, 1967), teacher, parent or administrative recommendation (Noland & Taylor, 1986; Breidenstein, 1936), grade point average (Noland & Taylor, 1986), and achievement test performance (Barlow, 1962; Berkum, Swanson, & Sawyer, 1966; Johnson & Scriven, 1967; Douglas, 1973; Slavin, 1987a; Slavin & Karweit, 1984; Wardrop, Cooke, Quilling, & Klausmeier, 1967). In some instances all students are grouped, while in others only certain subpopulations, such as the gifted or those in need of remedial instruction, are homogeneously grouped. Students might be grouped only for instruction in specific subjects, or for their entire educational experience (Slavin, 1987a, Dawson, 1987). Despite the great variety of practices used, by far the most common basis for instructional grouping is some measure of student ability (Jongsma, 1985).

The effects and desirability of homogeneous grouping of students are intensely debated and widely investigated topics. As Kulik and Kulik (1987, p. 22) state: "Researchers have been collecting data on the effects of homogeneous grouping for almost three-quarters of a century, and still disagree on its merits. Educators have argued about the effects of grouping for an even longer time. Today, some still hold that it is necessary for successful teaching, whereas others denounce it as an undemocratic practice with negative effects on children." The effect of homogeneous grouping on the achievement of elementary and secondary school students has been the subject of numerous research and evaluation studies. In addition, other research has focused on relationships between ability grouping and students' self-concepts, motivation and attitudes toward school. The results of these studies have been mixed, with some evaluators and researchers finding evidence that supports the use of homogeneous grouping (Kulik & Kulik, 1982; 1984; 1987; Kulik, 1985) and others finding contradictory evidence (Noland & Taylor, 1986; Slavin, 1987a; Slavin & Karweit, 1984; Slavin & Karweit, 1985; Hallinan & Sorensen, 1987; Dawson, 1987; Esposito; 1973; Oakes,

1985; Sorensen & Hallinan, 1984.) The social consequences of homogeneous grouping are similarly disputed. Some writers view tracking as a method for perpetuation of social inequity, guaranteeing that the already disadvantaged will receive incomplete and mediocre education (Oakes 1985; Goodlad & Oakes, 1988). Others, such as Nevi (1987, p. 25) claim tracking to be a necessary method for individualizing instruction and assert that "tracking is not an attempt to create differences, but to accommodate them."

Ability-grouping is defined by Dreeben (1984) as that which "refers to ability or achievement differences between classes within a school grade". Although there is enormous variety in the types of ability-grouping studied in the past and in the research designs used by various investigators, the principal literature has focused on the effects of ability-grouping on achievement, directly, through instructional differences, or indirectly, through inequity of opportunities (Goodlad, 1960; Slavin 1987a; Oakes, 1985; Bowles & Gintis, 1976).

Several investigators have attempted to synthesize the large and disparate body of research on the effects of homogeneous grouping through narrative reviews and meta-analyses. Some have distinguished between different methods for forming ability groups, while others have considered the effects of ability grouping overall. The researchers have reached a variety of conclusions.

Based upon the results of a meta-analysis on 720 measurements derived from experimental data in 50 studies comparing data from both homogeneously and heterogeneously grouped students, Noland and Taylor (1986) concluded that the practice of ability grouping does not increase student achievement, but has adverse effects on students' self-concepts and self-esteem. Some of the studies included in this meta-analysis only examined overall effects, while others examined effects within ability groups. Among the studies which examined within-group effects, ability grouping tended to have positive effects on achievement outcomes for high- and low- ability students, but very negative effects on achievement for average ability students. It should be noted, however, that most of the studies reviewed in this meta-analysis included no minority students; thus conclusions could not be stated for minority subgroups.

Kulik and Kulik (1982; 1984; 1987; Kulik, 1985) also reviewed the experimental literature on the effects of ability grouping, and reached conclusions differing dramatically from those reached by Noland

and Taylor (1986). Kulik and Kulik (1982, p. 620) concluded that "except for high-ability students in honors classes, ability grouping has little significant effect on learning outcomes, student attitudes toward subject matter and school, or self-concept. The differences that are found in grouped classes are all positive, however slight, and there is no evidence that homogeneous grouping is harmful." They concluded that ability grouping has significant positive effect on learning outcomes for high-ability students, negligible consequences for learning outcomes for other students, and negligible effect on attitude and self-concept for all students. Several meta-analyses conducted by Kulik and Kulik produced results consistent with this conclusion. In a meta-analysis of 31 studies of the effect of ability grouping on elementary students (Kulik and Kulik, 1984) differences in achievement were large enough to be considered statistically significant in 13 of the studies. Eleven of these 13 studies favored homogeneous grouping, and two favored heterogeneous grouping. The average effect of homogeneous grouping was equivalent to raising student achievement scores from the 50th to the 58th percentile. The investigators noted that these relatively dramatic effects for elementary students are larger than those usually seen in studies of secondary school students. The beneficial effect of grouping on achievement was most pronounced in programs for the gifted and talented. The effects of grouping on self-concept were insignificant. Another meta-analysis by Kulik (1985) of 85 studies of the effects of homogeneous grouping on elementary and secondary school students yielded similar results: the average achievement effect was positive, and equivalent to raising median achievement scores from the 50th to the 56th percentile, with the most dramatic gains seen in programs for the gifted and talented, and near zero gains for other types of groupings. Again, the average effect of grouping on self-esteem was found to be near zero, with a tendency toward increasing the self-esteem of low-ability students. A later meta-analysis examining 90 studies (Kulik and Kulik, 1987) again found small positive overall effects of ability grouping on achievement, with dramatic positive effects in programs for gifted students. Some studies were examined in more than one of the meta-analyses performed by Kulik and Kulik, which might, in part, account for the consistency of their findings.

Slavin (1987a) used "best-evidence synthesis", a combination of meta-analysis and narrative review, to examine achievement effects from 43 studies of various kinds of grouping in elementary

schools, including between-class ability grouping, within-class grouping for specific subjects, regrouping across classes for specific subject matter instruction, and regrouping across both class and grade for reading instruction (the Joplin plan). He reported results that were quite different from those found by Kulik and Kulik (1982; 1984; 1987) or Noland and Taylor (1986). When different methods for forming ability groups were examined separately, Slavin found that there was no significant achievement effect of ability grouping by class for any subgroup of students, including low-achievers or gifted and talented students. Relatively few studies examined the effect of regrouping only for reading and/or math instruction, and the results were inconclusive but suggested that this method might have a positive effect on achievement if instructional pace and materials are adapted to students' needs. Positive achievement effects for all student subgroups were found for the Joplin plan, where students were regrouped across grade levels for reading instruction. Within-class grouping for math had positive effects on achievement, but the researcher cautions that this effect might be attributable solely to the fact that this practice reduces the size of instructional groups, as similar gains were seen in a study by Slavin and Karweit (1984: 1985) where students were assigned to heterogeneous subgroups within classes for math instruction. Interestingly, Slavin (1987a) further reports that there were few studies of within-class grouping for reading or language arts. Based upon these findings, Slavin (1987a) concludes that students should remain in heterogeneous classes at most times, and be regrouped by ability only in subjects in which homogeneity is particularly important, such as math and reading. Further, the grouping plan should reduce heterogeneity only for the specific skill being taught, not just IQ or overall achievement; grouping plans should frequently reassess student placements and allow for easy reassignment. Another synthesis of the research literature on the effects of ability grouping for both elementary and secondary students (Slavin, 1987b) resulted in similar conclusions: between-class ability grouping is ineffective in improving student achievement, and has unfortunate social consequences such as racial segregation. The researcher also noted that regrouping for specific subject-matter instruction across grade levels, such as in the Joplin plan, results in groups that are likely to be racially balanced, unlike other types of ability grouping. Other writers have criticized Slavin's (1987a, 1987b) conclusions, suggesting, for example, that the benefits supposedly seen under the Joplin plan may be no more than novelty effect (Hiebert,

1987). Kulik and Kulik (1987) found Joplin plan grouping to be better than ungrouped instruction, but no better than between-class grouping. Unlike Slavin (1987a) they also found regrouping for specific subject-matter instruction to be no better than between-class ability grouping. In a study of 1477 students in 48 classes, Hallinan and Sorensen (1987) also found regrouping within classes for reading and math instruction to have no effect on achievement.

Unlike the researchers cited above, Dawson (1987) concluded, upon comprehensive review of the research literature on the effects of ability grouping, that there is no evidence that ability grouping enhances achievement or self-esteem of students, and that it may have profoundly negative consequences for students placed in low-ability classes. This conclusion is consistent with those drawn by Esposito (1973) and Oakes (1985). Dawson (1987) further cites evidence that students at all ability levels benefit from being in classes with high-ability students, both in terms of achievement and self-esteem.

The diverse conclusions cited above illustrate that the effects of ability grouping in a given educational situation cannot be predicted unequivocally. In synthesizing the experimental literature on the effects of tracking, Noland and Taylor (1986) noted that, while no experimenter in the studies they reviewed admitted bias, the experimenter's opinion about the efficacy and appropriateness of ability grouping was frequently obvious from his/her introduction, review of literature, and rationale, and that, when only achievement results were investigated "those who appear to favor ability grouping found that grouping students by ability improved their achievement, while those who appear to oppose ability grouping found the opposite" (p. 23). Interestingly, according to Noland and Taylor (1986) both researchers who favored ability grouping and those who opposed it typically found it to have negative effects on self-concept.

As mentioned earlier, most empirical studies of homogeneous grouping of students have focused on the effects of such grouping on student achievement, self-concept or attitudes. However, concerns about social consequences of homogeneous ability grouping also have been raised. In fact, ability grouping has become a major issue in some ongoing desegregation cases, where plantiffs have argued that ability grouping is used as a means of resegregating minority students within ostensibly

integrated schools (Slavin, 1987a). Ability grouping is asserted by Sorensen and Hallinan (1984) to increase inequality of educational opportunity because it increases the inequality of educational outcomes. Oakes and others have observed that, whatever method is used to form the ability groups, poor and minority children are disproportionately placed in tracks for low-ability students (Oakes, 1987, Slavin, 1987a). Sorensen and Hallinan (1984) further state "while some of the United States research on assignment to high school tracks has included race as a variable, little or no explicit concern has been devoted to studying the role of race in ability-group assignment." Their study involved the role of race in a high-ability-group assignment. They found that, although the race of an individual student had no direct effect on his/her placement in a high-ability group, the racial composition of classrooms did influence the formation of groups, since high-ability groups tended to be larger in racially mixed classrooms.

In a comprehensive review of the literature and meta-analysis of 50 studies, Noland and Taylor (1986) noted that most researchers investigating the effects of tracking did not mention or discuss any potential negative consequences of ability grouping on racial or socioeconomic integration within a school, but that those who did cite such potential consequences had findings three times more negative than the findings of researchers who did not cite such implications.

Although studies aimed at determining racial isolation as a consequence of ability-grouping are obscure, if they exist at all, Rosenbaum (1984) notes that, because all ability-grouping has as a common purpose the differentiation of instruction, "they [ability groups] create new social entities which have social properties and which are likely to create social outcomes. While these various types of groups are unlikely to create the same social outcomes, they share two important similarities:

1. Students are grouped with those defined to be similar to themselves and segregated from those who are defined to be different.
2. Group placement is based on socially valued criteria such as ability or postgraduate plans, so that group membership may rank one in a status hierarchy, formally identifying some individuals as better than others.

Rosenbaum calls for case studies of ability grouping that are specific to a particular "institutional structure or context," rather than large-scale studies that presume ability grouping effects are context-independent.

Rosenbaum (1984) has criticized the research on ability grouping for assuming that "ability grouping in all schools had the same effects...the massive body of ability-grouping research illustrates only too well the futility of studying ability-grouping effects as if this were a unitary phenomenon that always has the same effects." He further states that it suggests the need for separate analyses by type of grouping. However, even recent studies which compared the effects of different methods of ability grouping have not produced similar results. Reviewers of research have been unable to reach consensus about the effects and value of ability grouping. This failure to find a consistent pattern in the research literature suggests that the effects of grouping depend on a number of factors, including the social context of the setting and the nature of the grouping strategy used in each study compared. The diverse conclusions cited above illustrate that the effects of ability grouping in a given educational situation cannot be predicted unequivocally. Since there are no "rules of thumb" about the effect of ability grouping on students, it is imperative that effects be evaluated in each situation in which ability grouping is applied.

Objectives

The objectives of this study were to investigate the effects of *bona fide* homogeneous grouping of students in Grades 4 through 8 in a southeastern school system on the students' subsequent academic achievement. Since previous research has shown that homogeneous grouping often exacerbates students' racial isolation (Esposito, 1973), and the consequences of racial isolation are often held to be most detrimental for black students, the achievement effects of homogeneous grouping were to be investigated for black students as well as for all students regardless of race. Finally, since in previous studies only the short-term effects of homogenous grouping were investigated, an objective of this study was to examine the longitudinal effects of homogeneous grouping across two school years.

The specific research questions to be addressed through the study were as follows:

1.) Was there evidence of academic benefit for students in each of Grades 4 through 8 who were assigned to language arts classes through homogeneous ability grouping, in each of two academic years?
2.) Was there evidence of academic benefit for students in each of Grades 4 through 8 who were assigned to mathematics classes through homogeneous ability grouping, in each of two academic years?
3.) Was there evidence of academic benefit for black students in each of Grades 4 through 8 who were assigned to language arts classes through homogeneous ability grouping, in each of two academic years?
4.) Was there evidence of academic benefit for black students in each of Grades 4 through 8 who were assigned to mathematics classes through homogeneous ability grouping, in each of two academic years?
5.) Was there evidence of sustained academic benefit across two academic years for black students in each of Grades 4 through 8 who were assigned to language arts classes through homogeneous ability grouping, in each of two academic years?
6.) Was there evidence of sustained academic benefit across two academic years for black students in each of Grades 4 through 8 who were assigned to mathematics classes through homogeneous ability grouping, in each of two academic years?
7.) Was there evidence of differential academic benefit for black students in each of Grades 4 through 8 with language arts achievement test scores in each third of the pretest distribution of scores for black students, who were assigned to language arts classes through homogeneous ability grouping, in each of two academic years?
8.) Was there evidence of differential academic benefit for black students in each of Grades 4 through 8 with mathematics achievement test scores in each third of the pretest distribution of scores for black students, who were assigned to mathematics classes through homogeneous ability grouping, in each of two academic years?

Data Source and Method

The populations to which the methods described in this paper were applied were composed of over 4800 students in grades 4 through 8 in a southeastern school system. In each school within this system, students in these grades were assigned to language arts and mathematics classes on the basis of scores they achieved on the California Achievement Test Battery in the spring prior to class assignment. This method of student assignment had been approved by the Office for Civil Rights of the U.S. Department of Education, with the stipulation that the effects on student achievement be evaluated each year. To answer the research questions listed above, matched files containing scores on the California Achievement Test Battery were created for all students, and for black students only, who were in successive grades 4 through 8, during the school years 1986-87 or 1987-88, or over the two school years 1986-1988. Once analysis files had been created, the 25th, 50th and 75th percentiles of distributions of Mathematics Total and Language Arts Total test scores were computed in California Achievement Test scaled-score units. These scaled-score percentiles were then converted to corresponding percentile ranks in appropriate national norm distributions, using the April 1st through 7th norms for the California Achievement Tests (CTB/McGraw-Hill, 1986). For

Research Questions 7 and 8, the upper, middle and lower thirds of the distributions of Mathematics Total and Language Arts Total test scores for black students were computed in California Achievement Test scaled-score units, and then converted to corresponding percentile ranks.

"Academic benefit" had been operationally defined in a directive from the U. S. Department of Education's Office for Civil Rights as a pretest-to-posttest increase in median achievement of at least two percentile ranks on appropriate national norms. To investigate the academic effects of *bona fide* homogeneous grouping, changes in percentile ranks corresponding to the scaled-score medians of pretest and posttest Mathematics and Language Arts Total scores were compared to this two-percentile-rank threshold value. Positive changes equal to or exceeding two percentile ranks were classified as indicating educational benefit; changes not exceeding one percentile rank in absolute value were classified as indeterminate; and negative changes equal to or exceeding two percentile ranks were classified as indicating educational detriment. To examine the possibility that the achievement effects of homogeneous grouping of black students differed, depending on these students' initial achievement levels, separate analyses were conducted for black students who were in the lowest third, the middle third, and the highest third of their pretest achievement distributions. Tables were formed showing the results of each pretest-to-posttest comparison.

Results and Conclusions

Evaluation Questions 1 and 2

These evaluation questions concern the single-year educational effects of assignment of students to Language Arts and Mathematics classes, respectively, through *bona fide* homogeneous grouping. To examine these questions, achievement test scores for students who were in Grades 3 through 7 in the spring of 1986 and in the next sequential grade in the spring of 1987 were analyzed to determine the percentile rank in appropriate national norms of the California Achievement Tests corresponding to the median Language Arts Total and Mathematics Total scaled scores of these students. Identical analyses were conducted for students who were in these grade levels in the spring of 1987 and the spring of 1988, respectively. For each one-year interval, analyses were restricted to students for whom achievement tests data were available in the spring of two successive school years.

Consistent with the definition of academic benefit imposed on the school system by the Office for Civil Rights of the U.S. Department of Education, we classified as beneficial, a change in initial-year to second-year median achievement that corresponded to a gain of at least two percentile ranks; as indeterminate, a change in median achievement that did not exceed one percentile rank in absolute value; and as detrimental, a change in median achievement that corresponded to a loss of at least two percentile ranks.

The results of these analyses are summarized in Tables 1 through 4 and in Figures 1 and 2. Table 1 contains national percentile ranks for Language Arts Total scores corresponding to the median scaled scores for students in Grades 3 through 7 in the spring of 1986 and for students in Grades 4 through 8 in the spring of 1987. Differences between corresponding percentile ranks and the results of classifying these differences, using the rules described above, are also shown. Only for students initially in Grade 6 was the educational effect of *bona fide* homogeneous grouping found to be beneficial. For students initially in Grade 4, the educational effect was found to be indeterminate; for students initially in the other grades examined, the educational effect of *bona fide* homogeneous grouping was found to be detrimental. With the exception of students initially in Grade 3, the educational effect of homogeneous grouping in Language Arts during the 1986-87 school year was quite small.

Table 1

Median Language Arts Total achievement test scores on the California Achievement Tests for all students in indicated grades enrolled in the school system during the 1986-87 school year.

Number of Students	Grade in Spring 1986	National Percentile Rank of System Median in Spring 1986	Grade in Spring 1987	National Percentile Rank of System Median in Spring 1987	Change in Percentile Rank	Educational Effect
1003	3	62	4	58	-4	Detrimental
627	4	55	5	54	-1	Indeterminate
742	5	55	6	53	-2	Detrimental
1006	6	56	7	58	+2	Beneficial
719	7	55	8	53	-2	Detrimental

Table 2 contains national percentile ranks for Mathematics Total scores corresponding to the median scaled scores for students in Grades 3 through 7 in the spring of 1986 and for students in Grades 4 through 8 in the spring of 1987. Differences between corresponding percentile ranks and the results of classifying these differences, using the rules described above, are also shown. The educational effect of *bona fide* homogeneous grouping was found to be indeterminate for students initially in Grades 4 and 6, and detrimental for students initially in all other grades studied. The detrimental effects of homogeneous grouping were of larger magnitude for students assigned to Mathematics classes than for students assigned to Language Arts classes.

Table 2

Median Mathematics Total achievement test scores on the California Achievement Tests for all students in indicated grades enrolled in the school system during the 1986-87 school year.

Number of Students	Grade in Spring 1986	National Percentile Rank of System Median in Spring 1986	Grade in Spring 1987	National Percentile Rank of System Median in Spring 1987	Change in Percentile Rank	Educational Effect
1003	3	69	4	63	-6	Detrimental
627	4	62	5	61	-1	Indeterminate
742	5	59	6	54	-5	Detrimental
1006	6	59	7	60	+1	Indeterminate
719	7	61	8	55	-6	Detrimental

Table 3 contains national percentile ranks for Language Arts Total scores corresponding to the median scaled scores for students in Grades 3 through 7 in the spring of 1987 and for students in Grades 4 through 8 in the spring of 1988. Differences between corresponding percentile ranks and the results of classifying these differences, using the rules described above, are also shown. Only for students initially in Grade 5 was the educational effect of *bona fide* homogeneous grouping found to be beneficial. For students initially in Grade 4, the educational effect was found to be indeterminate; for students initially in the other grades examined, the educational effect of *bona fide* homogeneous grouping was found to

be detrimental. With the exception of students initially in Grade 3, the educational effect of homogeneous grouping in Language Arts during the 1987-88 school year was quite small.

Table 3

Median Language Arts Total achievement test scores on the California Achievement Tests for all students in indicated grades enrolled in the school system during the 1987-88 school year.

Number of Students	Grade in Spring 1987	National Percentile Rank of System Median in Spring 1987	Grade in Spring 1988	National Percentile Rank of System Median in Spring 1988	Change in Percentile Rank	Educational Effect
958	3	66	4	55	-11	Detrimental
891	4	60	5	59	-1	Indeterminate
956	5	56	6	58	+2	Beneficial
1057	6	58	7	56	-2	Detrimental
1018	7	60	8	58	-2	Detrimental

Table 4 contains national percentile ranks for Mathematics Total scores corresponding to the median scaled scores for students in Grades 3 through 7 in the spring of 1987 and for students in Grades 4 through 8 in the spring of 1988. Differences between corresponding percentile ranks and the results of classifying these differences, using the rules described above, are also shown. The educational effect of *bona fide* homogeneous grouping was found to be indeterminate for students initially in Grade 4, and detrimental for students initially in all other grades studied. The detrimental effects of homogeneous grouping were of larger magnitude for students assigned to Mathematics classes than for students assigned to Language Arts classes.

Table 4

Median Mathematics Total achievement test scores on the California Achievement Tests for all students in indicated grades enrolled in the school system during the 1987-88 school year.

Number of Students	Grade in Spring 1987	National Percentile Rank of System Median in Spring 1987	Grade in Spring 1988	National Percentile Rank of System Median in Spring 1988	Change in Percentile Rank	Educational Effect
958	3	67	4	58	-9	Detrimental
891	4	64	5	63	-1	Indeterminate
956	5	62	6	55	-7	Detrimental
1057	6	61	7	58	-3	Detrimental
1018	7	61	8	54	-7	Detrimental

The educational effects of assigning students to Language Arts and Mathematics classes through *bona fide* homogeneous grouping were far more often detrimental than beneficial. As shown in Figures 1 and 2, these findings were consistent across the two school years studied and for assignments to classes in both subject areas. Only in Language Arts were the effects of homogeneous grouping found to be beneficial for students in some grades.

Figure 1. Distribution of Effect of Homogeneous Grouping, by School Year

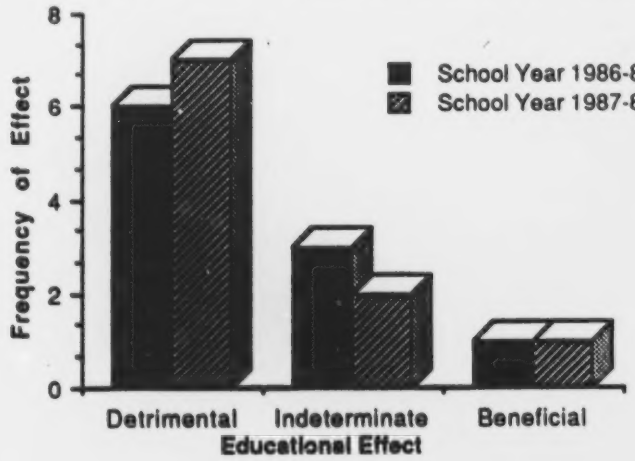
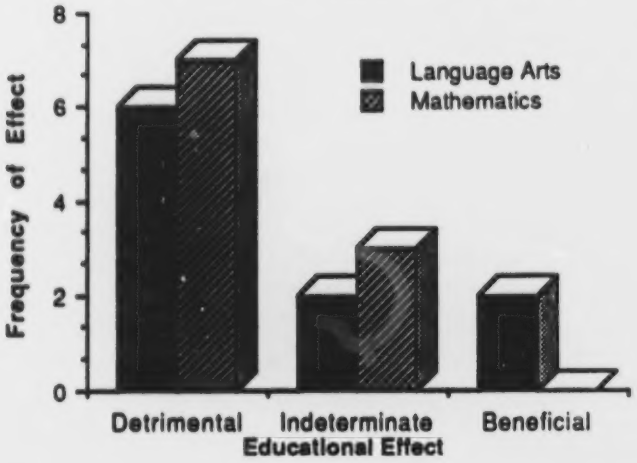


Figure 2. Distribution of Effect of Homogeneous Grouping, by Subject Area



Evaluation Questions 3 and 4

These evaluation questions concern the single-year educational effects of assignment of black students to Language Arts and Mathematics classes, respectively, through *bona fide* homogeneous grouping. To examine these questions, achievement test scores for students who were black and who were in Grades 3 through 7 in the spring of 1986 and in the next sequential grade in the spring of 1987 were analyzed to determine the percentile rank in appropriate national norms of the California Achievement Tests corresponding to the median Language Arts Total and Mathematics Total scaled scores of black students. Identical analyses were conducted for black students who were in these grade levels in the spring of 1987 and the spring of 1988, respectively. For each one-year interval, analyses were restricted to black students for whom achievement tests data were available in the spring of two successive school years.

Consistent with the definition of academic benefit imposed by the Office for Civil Rights of the U.S. Department of Education, we classified as beneficial, a change in initial-year to second-year median achievement that corresponded to a gain of at least two percentile ranks; as indeterminate, a change in median achievement that did not exceed one percentile rank in absolute value; and as detrimental, a change in median achievement that corresponded to a loss of at least two percentile ranks.

The results of these analyses are summarized in Tables 5 through 8 and in Figures 3 and 4. Table 5 contains national percentile ranks for Language Arts Total scores corresponding to the median scaled scores for black students in Grades 3 through 7 in the spring of 1986 and for black students in Grades 4 through 8 in the spring of 1987. Differences between corresponding percentile ranks and the results of classifying these differences, using the rules described above, are also shown. For black students initially in Grades 4 and 5, the educational effect of *bona fide* homogeneous grouping was found to be beneficial. For black students initially in Grades 3, 6, and 7, the educational effect was found to be indeterminate; the educational effect of *bona fide* homogeneous grouping in Language Arts was not found to be detrimental for black students during the 1986-87 school year. The educational effect of homogeneous grouping in Language Arts was found to be quite small for black students in all grades examined.

Table 5

Median Language Arts Total achievement test scores on the California Achievement Tests for black students in indicated grades enrolled in the school system during the 1986-87 school year.

Number of Students	Grade in Spring 1986	National Percentile Rank of System Median in Spring 1986	Grade in Spring 1987	National Percentile Rank of System Median in Spring 1987	Change in Percentile Rank	Educational Effect
517	3	43	4	42	-1	Indeterminate
290	4	38	5	40	+2	Beneficial
373	5	40	6	42	+2	Beneficial
521	6	42	7	43	+1	Indeterminate
355	7	42	8	42	0	Indeterminate

Table 6 contains national percentile ranks for Mathematics Total scores corresponding to the median scaled scores for black students in Grades 3 through 7 in the spring of 1986 and for black students in Grades 4 through 8 in the spring of 1987. Differences between corresponding percentile ranks and the results of classifying these differences, using the rules described above, are also shown. For black students initially in each of Grades 3 through 7, the educational effect of using *bona fide* homogeneous grouping to assign students to Mathematics classes was found to be consistently detrimental. With the exception of students initially in Grades 3 and 7, the educational effect of homogeneous grouping in Mathematics was found to be quite small.

Table 6

Median Mathematics Total achievement test scores on the California Achievement Tests for black students in indicated grades enrolled in the school system during the 1986-87 school year.

Number of Students	Grade in Spring 1986	National Percentile Rank of System Median in Spring 1986	Grade in Spring 1987	National Percentile Rank of system Median in Spring 1987	Change in Percentile Rank	Educational Effect
517	3	54	4	46	-8	Detrimental
290	4	45	5	42	-3	Detrimental
373	5	46	6	43	-3	Detrimental
521	6	45	7	42	-3	Detrimental
355	7	48	8	42	-6	Detrimental

Table 7 contains national percentile ranks for Language Arts Total scores corresponding to the median scaled scores for black students in Grades 3 through 7 in the spring of 1987 and for black students in Grades 4 through 8 in the spring of 1988. Differences between corresponding percentile ranks and the results of classifying these differences, using the rules described above, are also shown. For black students initially in Grades 4 through 6, the educational effect of *bona fide* homogeneous grouping was found to be beneficial. For black students initially in Grades 3 and 7, the educational effect was found to be detrimental. Although the beneficial educational effects of homogeneous grouping in Language Arts were found to be quite small, in at least one grade, the detrimental effect was found to be comparatively large.

Table 7

Median Language Arts Total achievement test scores on the California Achievement Tests for black students in indicated grades enrolled in the school system during the 1987-88 school year.

Number of Students	Grade in Spring 1987	National Percentile Rank of System Median in Spring 1987	Grade in Spring 1988	National Percentile Rank of System Median in Spring 1988	Change in Percentile Rank	Educational Effect
504	3	48	4	38	-10	Detrimental
452	4	43	5	45	+2	Beneficial
465	5	40	6	42	+2	Beneficial
535	6	43	7	45	+2	Beneficial
503	7	45	8	41	-4	Detrimental

Table 8 contains national percentile ranks for Mathematics Total scores corresponding to the median scaled scores for black students in Grades 3 through 7 in the spring of 1987 and for black students in Grades 4 through 8 in the spring of 1988. Differences between corresponding percentile ranks and the results of classifying these differences, using the rules described above, are also shown. For black students initially in each of Grades 3, 5, 6, and 7, the educational effect of using *bona fide* homogeneous grouping to assign students to Mathematics classes was found to be detrimental. For black students initially in Grade 4, the effect of homogeneous grouping was found to be indeterminate.

With the exception of students initially in Grades 3 and 6, the educational effect of homogeneous grouping in Mathematics during the 1987-88 school year was found to be quite small.

Table 8

Median Mathematics Total achievement test scores on the California Achievement Tests for black students in indicated grades enrolled in the school system during the 1987-88 school year.

Number of Students	Grade in Spring 1987	National Percentile Rank of System Median in Spring 1987	Grade in Spring 1988	National Percentile Rank of System Median in Spring 1988	Change in Percentile Rank	Educational Effect
504	3	54	4	43	-11	Detrimental
452	4	48	5	49	+1	Indeterminate
465	5	43	6	40	-3	Detrimental
535	6	48	7	42	-6	Detrimental
503	7	45	8	41	-4	Detrimental

Although the educational effects of assignment of black students to Mathematics classes through *bona fide* homogeneous grouping were more often detrimental than beneficial, this was not the case for Language Arts classes. As shown in Figure 3, the educational effects of homogeneous grouping of black students, when analyzed without regard to subject area, were more frequently detrimental than beneficial during both school years examined. However, Figure 4 reveals distinct differences in distributions of educational benefit for Language Arts and Mathematics class assignments, with Language Arts showing more frequent evidence of benefit than detriment, and the opposite pattern for Mathematics.

Figure 3. Distribution of Effect of Homogeneous Grouping for Black Students, by Year

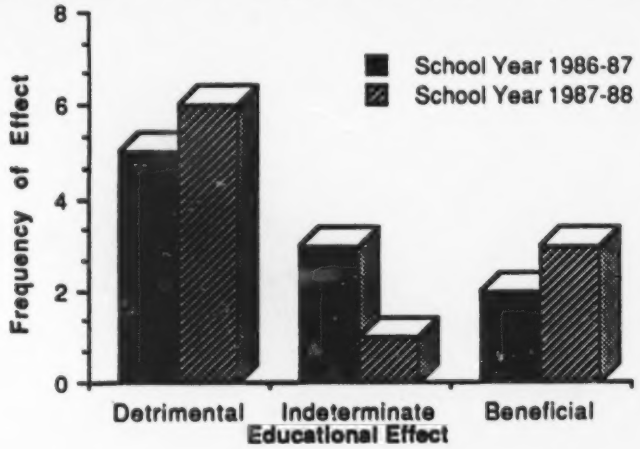
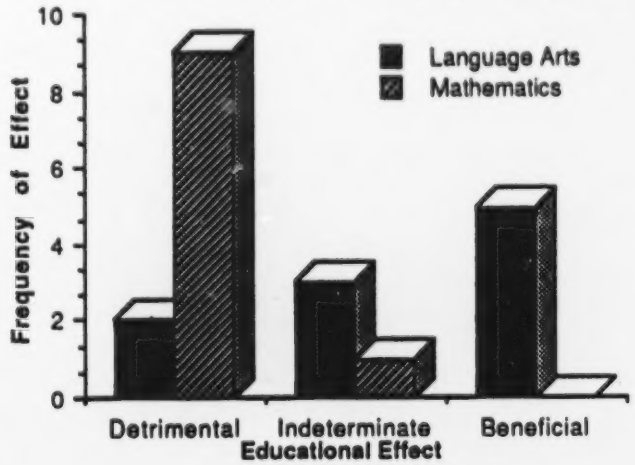


Figure 4. Distribution of Effect of Homogeneous Grouping for Black Students, by Subject



Evaluation Questions 5 and 6

These questions concern the sustained educational effects on black students of *bone fide* homogeneous grouping during two successive school years. To address these questions we constructed data files of black students for whom Language Arts Total scaled scores or Mathematics Total scaled scores were available during three successive test administrations, in the spring of 1986, in the spring of 1987, and in the spring of 1988.

Once these data files had been created, we computed the national percentile ranks corresponding to median Language Arts Total and Mathematics Total scaled scores for students who were in Grades 3 through 6 in the spring of 1986 and, correspondingly, in Grades 5 through 8 in the spring of 1988. Thus these percentile ranks were computed only for black students who had made normal progress through school during the 1986-87 and 1987-88 school years and who had been successfully tested during the 1986, 1987, and 1988 test administrations. Differences in corresponding percentile ranks from 1986 to 1988 were then computed and classified as being beneficial, indeterminate, or detrimental, using the criteria described earlier.

The results of these analyses are summarized in Tables 9 and 10 and Figures 5 through 7. Table 9 contains national percentile ranks for Language Arts Total scores corresponding to the median scaled scores for black students in Grades 3 through 6 in the spring of 1986 and in Grades 5 through 8 in the spring of 1988. Differences between corresponding percentile ranks and the results of classifying these differences, using the rules described above, are also shown. For black students initially in Grades 4 and 5, the educational effect of *bona fide* homogeneous grouping was found to be beneficial. But for black students initially in Grades 3 and 6, the educational effect was found to be detrimental. Both the beneficial and the detrimental educational effects of sustained homogeneous grouping in Language Arts were found to be relatively small for black students enrolled in the school system examined in this study.

Table 9

Median Language Arts Total achievement test scores on the California Achievement Tests for black students in indicated grades enrolled during the 1986-87 and the 1987-88 school year.s

Number of Students	Grade in Spring 1986	National Percentile Rank of System Median in Spring 1986	Grade in Spring 1988	National Percentile Rank of System Median in Spring 1988	Change in Percentile Rank	Educational Effect
452	3	48	5	45	-3	Detrimental
290	4	38	6	42	+4	Beneficial
345	5	40	7	45	+5	Beneficial
458	6	45	8	42	-3	Detrimental

Table 10 contains national percentile ranks for Mathematics Total scores corresponding to the median scaled scores for black students in Grades 3 through 6 in the spring of 1986 and in Grades 5 through 8 in the spring of 1988. Differences between corresponding percentile ranks and the results of classifying these differences, using the rules described above, are also shown. For black students initially in all of Grades 3 through 6, the educational effects of using *bona fide* homogeneous grouping to assign students to Mathematics classes were found to be detrimental. These effects would be considered small to moderate.

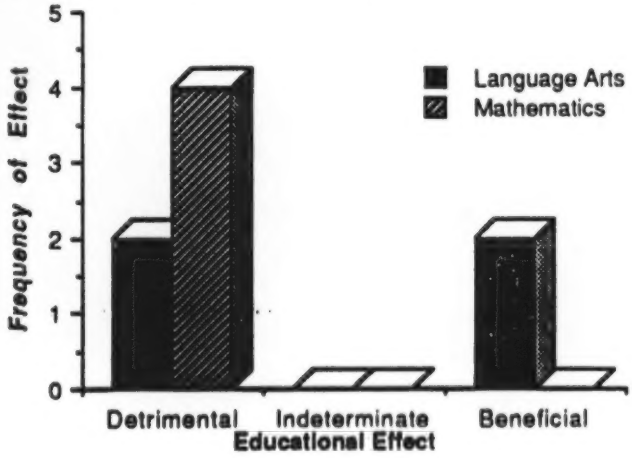
Table 10

Median Mathematics Total achievement test scores on the California Achievement Tests for black students in indicated grades enrolled during the 1986-87 and the 1987-88 school years.

Number of Students	Grade in Spring 1986	National Percentile Rank of System Median in Spring 1986	Grade in Spring 1988	National Percentile Rank of System Median in Spring 1988	Change in Percentile Rank	Educational Effect
452	3	55	5	49	-6	Detrimental
290	4	45	6	38	-7	Detrimental
345	5	48	7	43	-5	Detrimental
458	6	46	8	43	-3	Detrimental

The distributions summarized in Figure 5 clearly illustrate the mixed effects of sustained assignment of black students to homogeneously grouped classes in Language Arts and the consistently detrimental effects of assigning these students to homogeneously grouped classes in Mathematics, given the operational definitions of these terms described earlier.

Figure 5. Distribution of Effect of Sustained Homogeneous Grouping for Black Students



To more clearly illustrate the year-to-year effects of sustained assignment of black students to Language Arts and Mathematics classes through *bona fide* homogeneous grouping, we graphed successive percentile ranks in appropriate national norm distributions for the California Achievement Tests, for black students' median scaled scores in the spring of 1986, 1987, and 1988. Figure 6 contains plots of Language Arts Total scores for students initially in Grades 3, 4, 5, and 6 in the spring of 1986, and Figure 7 contains corresponding plots of black students' Mathematics Total scores. Figure 6 reveals steady growth in the percentile ranks of black students' median Language Arts Total scores for students initially in Grades 4 and 5, invariant performance followed by a decrement for students initially in Grade 6, and an inconsistent pattern of loss followed by gain for students in Grade 3. The plots of Mathematics scores illustrated in Figure 7 reveal consistent decrements in performance except for black students initially in Grade 3; for these students, there was a one-point increase in the national percentile rank corresponding to their median Mathematics Total score from 1987 to 1988.

Figure 6. Language Arts Total Percentile Ranks of Median Scores for Black Students

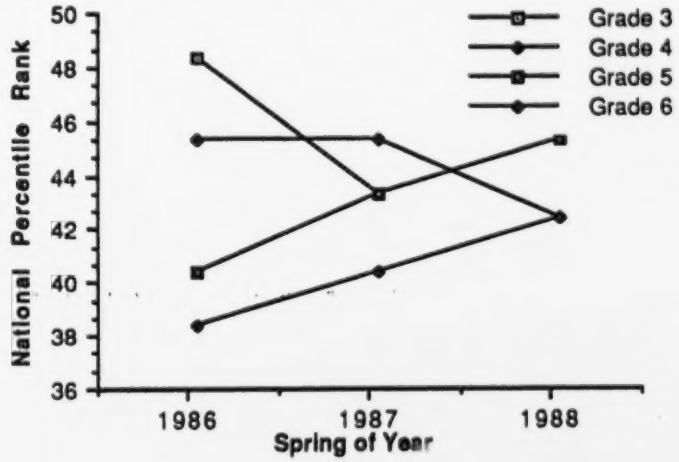
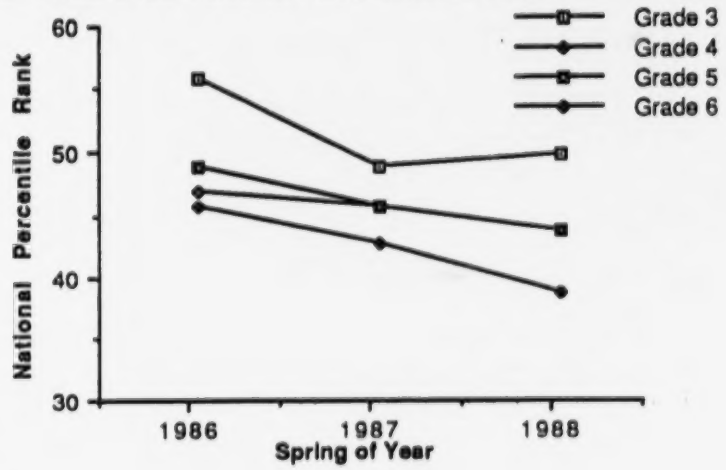


Figure 7. Mathematics Total Percentile Ranks of Median Scores for Black Students



Evaluation Questions 7 and 8

In posing these evaluation questions, we considered the possibility that the effects of assigning black students to classes in Language Arts and Mathematics through *bona fide* homogeneous grouping would differ, depending on the students' initial achievement levels. We therefore constructed files of test

scores for black students who were initially in the lowest third, the middle third, and the highest third of the Language Arts Total and Mathematics Total score distributions for their grade, for each of the school years 1986-87 and 1987-88. We then computed the national percentile rank corresponding to the median scaled score for black students initially in each third of the score distributions for their grade, in spring 1986, spring 1987, and spring 1988. We calculated differences between corresponding percentile ranks for black students in each third of their score distribution in Grade 3 in spring 1986 and Grade 4 in spring 1987, and so on, for sequential grade pairings between Grades 3 and 8, and for the 1986-87 and 1987-88 school years.

Consistent with the definition of academic benefit imposed on the school system by the Office for Civil Rights of the U. S. Department of Education, we classified as beneficial, a change in initial-year to second-year median achievement that corresponded to a gain of at least two percentile ranks; as intermediate, a change in median achievement that did not exceed one percentile rank in absolute value; and as detrimental, a change in median achievement that corresponded to a loss of at least two percentile ranks.

The results of these analyses are summarized in Tables 11 through 14 and Figures 8 and 9. Table 11 contains percentile ranks on the California Achievement Tests corresponding to median Language Arts Total scaled scores for black students in the lowest, middle, and highest thirds of their initial score distributions, who were enrolled in Grades 3 through 7 in spring 1986 and in the next successive grade in spring 1987. Differences between corresponding percentile ranks have been computed and classified, as noted above. These data suggest that *bona fide* homogeneous grouping in Language Arts was beneficial for black students initially in the lowest third of their score distribution (and presumably in the lowest ability groups); of largely indeterminate value for black students initially in the middle third of their score distribution (and presumably in a middle-range ability group); and detrimental or of mixed value for black students initially in the highest third of their score distribution (and presumably in the middle- or highest-range ability groups).

Table 11

Median Language Arts Total achievement test scores on the California Achievement Tests for black students enrolled during the 1986-87 school year with scores initially in the lowest, middle, and highest thirds of score distributions for indicated grades.

Number of Students	Grade in Spring 1986	National Percentile Rank of System Median in Spring 1986	Grade in Spring 1987	National Percentile Rank of System Median in Spring 1987	Change in Percentile Rank	Educational Effect
			Lowest Third			
174	3	22	4	24	+2	Beneficial
100	4	21	5	22	+1	Indeterminate
131	5	23	6	27	+4	Beneficial
181	6	22	7	26	+2	Beneficial
120	7	20	8	22	+2	Beneficial
			Middle Third			
175	3	45	4	42	-3	Detrimental
98	4	39	5	40	+1	Indeterminate
123	5	41	6	40	-1	Indeterminate
173	6	45	7	45	0	Indeterminate
125	7	43	8	42	-1	Indeterminate
			Highest Third			
168	3	76	4	68	-8	Detrimental
92	4	70	5	65	-5	Detrimental
118	5	70	6	74	+4	Beneficial
167	6	72	7	68	-4	Detrimental
109	7	70	8	70	0	Indeterminate

Table 12 contains percentile ranks on the California Achievement Tests corresponding to median Mathematics Total scaled scores for black students in the lowest, middle, and highest thirds of their initial score distributions, who were enrolled in Grades 3 through 7 in spring 1986 and in the next successive grade in spring 1987. Differences between corresponding percentile ranks have been computed and classified, as noted above. These data suggest that *bona fide* homogeneous grouping in Mathematics was of mixed value for black students initially in the lowest third of their score distribution (and presumably in the lowest ability groups); of largely indeterminate value for black students initially in the middle third of

their score distribution (and presumably in a middle-range ability group); and of mixed value or detrimental for black students initially in the highest third of their score distribution (and presumably in the middle- or highest-range ability groups).

Table 12

Median Mathematics Total achievement test scores on the California Achievement Tests for black students enrolled during the 1986-87 school year with scores initially in the lowest, middle, and highest thirds of score distributions for indicated grades.

Number of Students	Grade in Spring 1986	National Percentile Rank of System Median in Spring 1986	Grade in Spring 1987	National Percentile Rank of System Median in Spring 1987	Change in Percentile Rank	Educational Effect
			Lowest Third			
181	3	27	4	27	0	Indeterminate
99	4	24	5	21	-3	Detrimental
124	5	21	6	25	+4	Beneficial
176	6	19	7	24	+5	Beneficial
119	7	21	8	21	0	Indeterminate
			Middle Third			
168	3	55	4	48	-7	Detrimental
95	4	45	5	41	-4	Detrimental
133	5	48	6	45	-3	Detrimental
174	6	45	7	41	-4	Detrimental
119	7	48	8	42	-6	Detrimental
			Highest Third			
168	3	84	4	71	-13	Detrimental
96	4	73	5	77	+4	Beneficial
116	5	74	6	69	-5	Detrimental
171	6	75	7	72	-3	Detrimental
117	7	77	8	74	-3	Detrimental

Table 13 contains percentile ranks on the California Achievement Tests corresponding to median Language Arts Total scaled scores for black students in the lowest, middle, and highest thirds of their initial score distributions, who were enrolled in Grades 3 through 7 in spring 1987 and in the next successive grade

in spring 1988. Differences between corresponding percentile ranks have been computed and classified, as noted above. These data suggest that *bona fide* homogeneous grouping in Language Arts was of mixed effect for black students initially in the lowest third of their score distribution (and presumably in the lowest ability groups); of mixed effect for black students initially in the middle third of their score distribution (and presumably in a middle-range ability group); and detrimental or of indeterminate value for black students initially in the highest third of their score distribution (and presumably in the middle- or highest-range ability groups).

Table 13

Median Language Arts Total achievement test scores on the California Achievement Tests for black students enrolled during the 1987-88 school year with scores initially in the lowest, middle, and highest thirds of score distributions for indicated grades.

Number of Students	Grade in Spring 1987	National Percentile Rank of System Median in Spring 1987	Grade in Spring 1988	National Percentile Rank of System Median in Spring 1988	Change in Percentile Rank	Educational Effect
			Lowest Third			
173	3	23	4	24	+1	Indeterminate
149	4	23	5	25	+2	Beneficial
154	5	20	6	20	0	Indeterminate
183	6	24	7	26	+2	Beneficial
168	7	25	8	23	-2	Detrimental
			Middle Third			
166	3	48	4	38	-10	Detrimental
167	4	45	5	46	+1	Indeterminate
170	5	40	6	43	+3	Beneficial
177	6	43	7	45	+2	Beneficial
174	7	45	8	40	-5	Detrimental
			Highest Third			
165	3	80	4	66	-14	Detrimental
135	4	76	5	71	-5	Detrimental
141	5	71	6	70	-1	Indeterminate
175	6	76	7	70	-6	Detrimental
161	7	70	8	69	-1	Indeterminate

Table 14 contains percentile ranks on the California Achievement Tests corresponding to median Mathematics Total scaled scores for black students in the lowest, middle, and highest thirds of their initial score distributions, who were enrolled in Grades 3 through 7 in spring 1987 and in the next successive grade in spring 1988. Differences between corresponding percentile ranks have been computed and classified, as noted above. These data suggest that *bona fide* homogeneous grouping in Mathematics was detrimental or of indeterminate value for black students initially in the lowest third of their score distribution (and presumably in the lowest ability groups) and was detrimental for black students initially in the middle third of their score distribution (and presumably in a middle-range ability group) and for black students initially in the highest third of their score distribution (and presumably in the middle- or highest-range ability groups).

Table 14

Median Mathematics Total achievement test scores on the California Achievement Tests for black students enrolled during the 1987-88 school year with scores initially in the lowest, middle, and highest thirds of score distributions for indicated grades.

Number of Students	Grade in Spring 1987	National Percentile Rank of System Median in Spring 1987	Grade in Spring 1988	National Percentile Rank of System Median in Spring 1988	Change in Percentile Rank	Educational Effect
			Lowest Third			
184	3	27	4	24	-3	Detrimental
150	4	26	5	26	0	Indeterminate
160	5	21	6	19	-2	Detrimental
185	6	26	7	22	-4	Detrimental
170	7	23	8	24	+1	Indeterminate
			Middle Third			
157	3	55	4	46	-9	Detrimental
152	4	48	5	45	-3	Detrimental
152	5	44	6	41	-3	Detrimental
178	6	48	7	45	-3	Detrimental
167	7	45	8	43	-2	Detrimental
			Highest Third			
163	3	85	4	71	-14	Detrimental
149	4	76	5	70	-6	Detrimental
153	5	80	6	70	-10	Detrimental
172	6	76	7	72	-4	Detrimental
166	7	73	8	71	-2	Detrimental

Figure 8 contains a summary for both school years and all grade levels examined, of the effects of assigning black students in the lowest, middle, and highest thirds of their initial score distributions to Language Arts classes through *bona fide* homogeneous grouping. There is indication of educational benefit for black students who were initially in the lowest third of their score distribution and of educational detriment for black students who were initially in the highest third of their score distribution. These effects may be attributable in part to the phenomenon of regression effect (Glass & Hopkins, 1984). The effects for black students who were in the middle third of their initial score distribution were mixed, and most frequently of indeterminate value.

Figure 8. Distribution of Effect of Grouping in Language Arts for Black Students, by Thirds

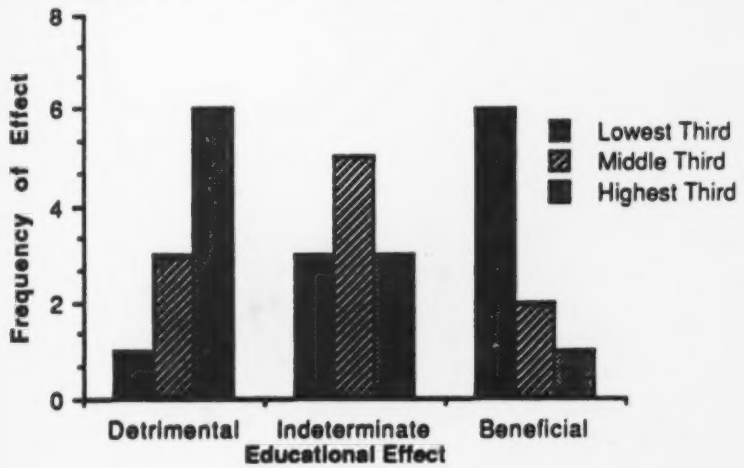
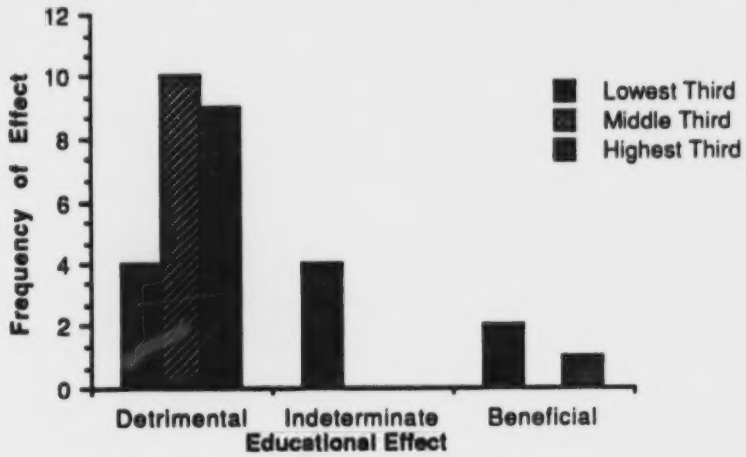


Figure 9 contains a summary for both school years and all grade levels examined, of the effects of assigning black students in the lowest, middle, and highest thirds of their initial score distributions to Mathematics classes through *bona fide* homogeneous grouping. There is a decidedly mixed indication of educational benefit for black students who were initially in the lowest third of their score distribution, with educational detriment and indeterminate effects occurring with equal frequency. There is clear, and almost consistent, evidence of educational detriment for black students who were in the middle third or the highest third of their initial score distribution.

Figure 9. Distribution of Effect of Grouping in Mathematics for Black Students, by Thirds



SUMMARY

The use of *bona fide* homogeneous grouping to assign students to language arts and mathematics classes results in substantial racial isolation (Jaeger, Drury, & Dalton-Rann, 1990). That being the case, the burden of demonstrating the academic benefit for black students of class assignment through *bona fide* homogeneous grouping rests with the school system examined in this study.

There is evidence that use of *bona fide* homogeneous grouping to assign black students to Language Arts classes is more often beneficial than not, as summarized in Figure 4. In five of ten comparisons across five grade levels and two school years, the effect was beneficial; in three comparisons, the effect was indeterminate; and in two comparisons, the effect was detrimental. However, the use of *bona fide* homogeneous grouping to assign black students to Mathematics classes is decidedly detrimental, with detrimental effects resulting in nine of ten comparisons, and an indeterminate effect resulting from one comparison. If homogeneous grouping is to be used for student assignment in the future, these results suggest that such assignments be restricted to Language Arts classes.

Examination of the sustained (two-year) effects of assigning black students to Language Arts and Mathematics classes through *bona fide* homogeneous grouping revealed mixed results for Language Arts classes and consistently detrimental effects for Mathematics classes. As summarized in Figure 5, assignment to Language Arts classes was found to be beneficial in two of four comparisons and detrimental in the other two; assignment to Mathematics classes was found to be detrimental in all four comparisons.

A more detailed examination of the single-year assignment of black students to Language Arts classes revealed a predominance of beneficial effects attributable to homogeneous grouping for the lowest-scoring black students, a predominance of indeterminate effects for black students scoring in the middle third of their initial achievement distribution, and a predominance of detrimental effects for black students scoring in the highest third of their initial achievement distribution (see Figure 8). Thus the use of *bona fide* homogeneous grouping to assign black students to Language Arts classes appears to be clearly beneficial only for those whose initial achievement levels are among the lowest. This apparent benefit may be attributable in part to the phenomenon of regression effect (Glass & Hopkins, 1984). Similar analyses of the results of assigning black students of differing initial achievement levels to Mathematics classes revealed a more consistent pattern of educational detriment; only occasionally was such assignment found to be beneficial for black students in the lowest third of their achievement test distributions (see Figure 9).

When the effects of *bona fide* homogeneous grouping were summarized for all students regardless of race, detrimental effects predominated. For assignments to Language Arts classes, detrimental effects were found in six of ten comparisons, indeterminate effects were found in two of ten comparisons, and beneficial effects were found in two of ten comparisons. For assignments to Mathematics classes, detrimental effects were found in seven of ten comparisons and indeterminate effects were found in the other three (see Figure 2). On the basis of these results, the use of homogeneous grouping to assign Grade 3 through Grade 8 students to classes in Mathematics or Language Arts should be questioned seriously.

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